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ARITHMETIC.

Conducted by B. F. FINKEL, Springfield, Mo. All contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

74. Proposed by JOHN T. FAIRCHILD, Principal of Crawfis College, Crawfis College, Ohio.

When U. S. Bonds are quoted in London at 108 $\frac{1}{4}$ and in Philadelphia at 112 $\frac{1}{4}$, exchange \$4.48 $\frac{1}{2}$, gold quoted at 107, how much more was a \$1000 U. S. bond worth in London than in Philadelphia?

Solution by G. B. M. ZERR, A. M., Ph. D., Texarkana, Arkansas.

If I understand the problem correctly, the exchange price is not necessary for the solution.

$$\$1000 \times 1.12\frac{1}{4} = \$1122.50, \text{ price in Philadelphia.}$$

$$\$1000 \times 1.08\frac{1}{4} = \$1087.50, \text{ price in London.}$$

But one dollar of London gold is worth \$1.07 of Philadelphia currency.

$$\therefore \$1087.50 \times 1.07 = \$1163.62\frac{1}{2}, \text{ price of London bond in U. S. currency.}$$

$\therefore \$1163.62\frac{1}{2} - \$1122.50 = \$41.12\frac{1}{2}$, the amount the London bond cost an American more than the Philadelphia bond.

To find the difference in cost to an Englishman in London, we proceed as follows:

$$\$1000 \times 1.12\frac{1}{4} = \$1122.50.$$

$\$1122.53 \div 1.07 = \$1049.06\frac{5}{7}$, price of the Philadelphia bond in English gold.

$$\$1000 \times 1.08\frac{1}{4} = \$1087.50.$$

$$\$1087.50 - \$1049.06\frac{5}{7} = \$38.43\frac{4}{7}.$$

$$\$38.43\frac{4}{7} \div \$4.89\frac{1}{2} = 7\mathcal{L} 17s .433d.$$

[We believe Dr. Zerr's view of this problem to be the correct one. **EDITOR.**]

77. Proposed by F. S. ELDER, Professor of Mathematics, Oklahoma University, Norman, Oklahoma.

For how many seconds must I count the clicking of the rails under a train that the number of rails counted may be equal to the speed of the train in miles per hour, a rail being 30 feet long.

I. Solution by FREDERIC R. HONEY, Ph. B., New Haven, Connecticut, and CHAS. C. CROSS, Laytonsville, Maryland.

This problem is similar to the one proposed in the July-August number, Vol. III. The result is independent of the number of rails counted and of the number of miles per hour the train is running.

In the problem referred to, the answer is $3a/88$ minutes during which the poles are counted, where a equals the number of yards the polls are apart.

In the present case, $a=10$ yards. Hence, substituting, $3a/88$ minutes = $30/88$ minutes = $20\frac{5}{11}$ seconds.

II. Solution by G. B. M. ZERR, A. M., Ph. D., Texarkana, Arkansas, and the PROPOSER.

Let t = number of seconds, n = number of miles per hour.

$\therefore 5280n/3600 = 22n/15$ feet per second = speed of train. Also in t seconds train goes $30n$ feet.

$\therefore 30n/t$ = number of feet in one second.

$\therefore 30n/t = 22n/15$. $\therefore t = 20\frac{5}{11}$ seconds.

78. Proposed by NELSON S. RORAY, South Jersey Institute, Bridgeton, New Jersey.

Solve by pure arithmetic, no algebraic symbols: A Texan farmer owns 5169 cattle; there are 3 times as many horses as cows, plus 569, and 4 times as many cows as sheep, minus 126; how many has he of each? [From *Brooks' Higher Arithmetic*.]

Solution by G. B. M. ZERR, A. M., Ph. D., Texarkana, Arkansas, and J. C. CORBIN, Principal of Schools, Pine Bluff, Arkansas.

$5169 + 126 - 569 = 4726$ = number of cattle when there are 4 times as many cows as sheep and 3 times as many horses as cows.

Every time he takes 1 sheep, he takes 4 cows and 12 horses, or 17 in all.

\therefore he has as many lots of 1 sheep, 4 cows, 12 horses, as 17 is contained in 4726. $\therefore 4726 \div 17 = 278$.

$\therefore 278 \times 1$ = number of sheep = 278

$278 \times 4 - 126$ = number of cows = 986

$278 \times 12 + 569$ = number of horses = 3905

Total = 5169

This problem was solved with a different view of its enunciation by Frederic R. Honey, and O. S. Westcott, A. M., Sc. D., Principal North Division High School, Chicago, Illinois.

[NOTE. P. S. Berg and H. C. Wilkes should each have received credit in the last number for solving problems 75 and 76. EDITOR.]

ALGEBRA.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

70. Proposed by J. A. CALDERHEAD, A. B., Professor of Mathematics in Curry University, Pittsburgh, Pennsylvania.

Given $\sqrt[3]{a+x} + \sqrt[3]{a-x} = \sqrt[3]{c}$ to find x .

I. Solution by J. MARCAS BOORMAN, Consultative Mechanician, Counselor at Law, Inventor, Etc., Hewlett, Long Island, New York; EDWARD R. ROBBINS, Master in Mathematics and Physics in Lawrenceville School, Lawrenceville, New Jersey; E. L. SHERWOOD, A. M., Principal of City Schools, West Point, Mississippi; O. W. ANTHONY, M. Sc., Columbian University, Washington, D. C.; A. H. HOLMES, Brunswick, Maine; and J. SCHEFFER, A. M., Hagerstown, Maryland.

Cubing, transposing, etc.,

$$(a^2 - x^2)^{\frac{1}{3}} [(a+x)^{\frac{1}{3}} + (a-x)^{\frac{1}{3}}] = (c-2a)/3, \text{ or } (a^2 - x^2)^{\frac{1}{3}} [c^{\frac{1}{3}}] = (c-2a)/3.$$